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COMBINED MONTHLY REPORT
BRANCH OF RESEARCH

FOREST EXPERIMENT STATIONS
DENDROLOGY
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FOREST ECONOMICS
GRAZING RESEARCH

JUL 1926

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COMBINED MONTHLY REPORT

BRANCH OF RESEARCH

July, 1926

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FOREWORD

Introduction to Organic Research

E. E. Reid

(To be continued)

Introduction

Research and the Research Spirit. In these days of scientific and industrial progress, "research" is a word to conjure with. The word has an impressive sound, and rightly too, since by research great discoveries have been made, by research great inventions have been perfected, by research new processes have been devised, and by research great chemical plants have come into being. We think of indigo, of alizarine, of the aniline dyes, of the extraction of aluminum, of tungsten lamps, of the synthesis of sugars, of salvarsan and of dozens of other epoch-making discoveries. If "one who causes two blades of grass to grow where one grew before" is a benefactor of mankind, surely he who enables two chemical plants to flourish where formerly there was only one deserves well the gratitude of the race. We can not honor too highly those who lead out into new lines of thought and investigation. The real dates of history are those of scientific discoveries, not the accession of kings or the outbreak of revolutions. The discovery of the extraction of iron from the ore meant more for the human race than the founding of Rome and the invention of Bessemer steel was a greater advance than the American Revolution. The advent of railroads, steamships, steel buildings, none of which would be possible without cheap and uniform steel, has altered the everyday life of our people more than a change of government could possibly do. The fruits of research are greater than the fruits of war. Pasteur was right when he said: "In our century, science is the soul of the prosperity of nations and the living source of all progress. Undoubtedly, the tiring daily discussions of politics seem to be our guide. Empty appearances! - What really lead us forward are a few scientific discoveries and their applications."

But what is research? the achievement of the super-man? the sport of kings? the privilege of the exalted few? It is all of these and more; super-men may exhaust themselves in its pursuit, a king might pawn his crown to taste its joys, and the highest of earth may be made rich by its rewards, but it is like faith and love, which men can not be exhausted by the greatest yet may be partaken of by the humblest, provided they are pure in heart. There are no limitations as to age, wealth or social position, yet the restrictions are severe enough to keep out the unworthy.

What then is research? It is not something portentous, something to be spoken of with bated breath as if pertaining to a higher sphere, but as Professor Remsen says:

"There is nothing mysterious about research. Every human being, in fact every animal, is by nature engaged in research, that is to say, trying to find out something about its environment. Perhaps the word research is a rather large one to connote these elementary activities, but it is nevertheless true that they are in principle of the same kind as those which are commonly understood when the word is used. There have always been researchers, and the knowledge we have of the universe is due to them. Notwithstanding all that has been learned in the ages past, the problems that have been solved are almost insignificant compared with those that remain to be solved. Every important discovery, or perhaps it is safe to say every discovery, suggests new problems."

Closer examination shows that "research" is simply re-search, the ordinary word "search" with "re" prefixed, which means that if we search and do not find we must re-search,- go back and search till we do find. There is no limit to the "re" as to time or trouble, the requirement being that the object of the search be located. This "re" means not simply again but again and again, not "until seven times, but until seventy times seven." Looking for a needle in a haystack has long been the popular idea of futility and it is unlikely that a superficial search would reveal the hiding place of the elusive needle but research would examine every several straw, splitting it open if need be, and would inevitably locate the needle.

The quest may be the discovery of the chemistry of life or the determination of the sixth decimal place in the density of alcohol and elaborate or simple resources may be required but there must be thoroughness in either case and nothing must be left undone that might contribute to the certainty and accuracy of the result.

Research is an elastic term and may be applied to the greatest efforts of the mightiest intellects and also to the slow painful motions of small minds. Research may be comprehensive and colossal or it may be minute and even inconsequential.

Research is finding out something, adding something to the known. It is the reality and not the size of the addition that matters: a small advance in knowledge may be just as real as a large one and a number of small gains make up progress. Columbus discovered the western continents but it has required the labors of thousands of explorers, on a lesser scale, to chart the inlets and coves along their shores, and to explore the mountains and plains of their vast inland territory. It is all the same work and the one explorer is as real a discoverer as the other. No one realizes as well as the chemist that a properly chosen sample, however small, may truly represent the composition of an entire ship load of thousands of tons. The composition of the water of the seven seas has been determined by the analysis and synthesis of a few grams of water. A gram, or even a milligram, of gold is as truly gold as all the gold in the crown jewels of the kingdoms of the world. Gold, if it be gold at all, is real gold; it is so with research. The smallest fact ascertained, provided it is new and is positively proved, is a real advance in knowledge, just as real as the greatest discovery. We do not speak of some gold as valuable and other gold as not. All gold is valuable. One nugget may be larger than another

and hence bring more at the mint but gold is gold, and whether it be nuggets panned in the Klondike or microscopic particles extracted by the cyanide mills of Africa, every grain of the shining dust adds that much to the wealth of the world. The determination of the melting point of a single new substance adds to the sum of human knowledge. This is research and is valuable. A number of such facts would be of greater, though not more real value. The door is open and whosoever will may enter the sacred company of discoverers and stand with Columbus, Newton, Lavoisier, Berzelius, Liebig, Perkin and their like, as those who advance into the unknown and enlarge human knowledge, the benefactors of mankind.

In thus admitting to the exalted caste of discoverers those who offer small contributions as freely as those who come laden with rich treasures, we dare not make any discount on the quality. Brass and pyrites, however they may glitter, can not pass the assayer; only twenty-four karat gold can be accepted. To be an advance in human knowledge the alleged discovery must be new and it must be true. To be a discovery it must be an actual advance on what was previously known by any mortal on that subject and to be of any worth it must be proved beyond any peradventure of a doubt. A piece of work to be of value must be so done and so recorded that it will newer have to be done over. An accurate observation is true till the end of time. The interpretation of a fact may change, as theories come and go, but the fact itself, once established, is true for all time. There is nothing as unsatisfactory as climbing a mountain through loose cinders or over rolling stones where one slips back at every step. One would fain mount on solid rock where one's tread is sure and each step upward is a permanent advance. A vast amount of work goes for naught because it is not quite good enough for publication and permanent record and has to be done over every time any one needs the information.

One purpose of this is to encourage those who can not do great things to do small ones but to do them with a spirit and in a manner that will make them great. We must insist on the same high standard for small contributions to science as for large. The same criterions of newness, of truth, and of accuracy must be applied to the one as to the other. Good technique, keen analysis and sound reasoning may be shown in a small task as well as in a large one. He who is limited in opportunities has this encouragement, that although he can not undertake as large a problem as some one else, he can do what he does do just as well.

There are comparatively few so situated as to be able to carry out extensive investigations continuously over long periods of time, but there are many who can find some time and get together sufficient apparatus for the study of some small point or the preparation of some compound. There are many who stand back for years waiting for the opportunity and facilities to undertake some big problem. One should be ambitious to attack the biggest possible problem but meantime many small ones may be solved. Even a large problem may be handled on the installment plan. An ex-president may make a trip to Africa with a whole regiment of hunters, guides, naturalists, photographers, writers, etc., and bring back enough big game to stock a museum while an humbler man may add one butterfly or one snail at a time

and at the end of his life have a world-famous collection. Small problems well solved are the best preparation for larger ones. "He that is faithful in little ~~is faithful in little~~ is faithful also in much." The Scotch say "many mickles make a muckle" which is certainly true in finance and in science also, provided the "mickles" are properly related. A house is builded by adding one small brick at a time but the bricks must be accurately laid and placed according to a well drawn plan if the result is to be a worthy structure.

Of course there is no desire to discourage the study of great problems but climbing small hills is good practice for those who would scale the Matterhorn and in ascending the great mountain the best way is to make sure of one step at a time. The better equipment, mental and material, one has, the better work one can do and the larger problem one can undertake. Without training one can accomplish little of value but many problems can be handled with meagre material equipment.

It is doubtful if any man ever had a keener eye for research ability in others or did more to develop it than Daniel Coit Gilman. Of the research spirit he wrote:

"It is perpetually active. It is the search for the truth - questioning, doubting, verifying, sifting, testing, proving, that which has been handed down; observing, weighing, measuring, comparing the phenomena of Nature, open and recondite. In such researches, a degree of accuracy is nowadays reached which was impossible before the lens, the balance, and the metre, those marvelous instruments of precision, had attained their modern perfection.

"With the growth of the scientific spirit grows the love of truth, and with the love of truth in the abstract comes the love of accuracy in the concrete."

According to Dr. Nichols there must be the will to research.

"True research must be intentional and intensive. We must really seek if we would find. We must really knock at the doors of the secret chambers of knowledge, if they are to be opened to us. We must have imagination, it is true, but we must have more than that. There must be the foundation of sound education, and the ability to extend it to embrace new and unexpected knowledge, and apply this in turn as we progress upwards.

"Scientific discovery is really not a haphazard matter. The art of making it can be cultivated and definite rules of research can be laid down."

According to Dr. Whitney the limitations are internal rather than external."

"It is important to realize that the need, facilities and possibilities of research are all about us, retarded only by the inertia that is in us."

FACTORS CONTROLLING GERMINATION AND EARLY SURVIVAL IN THE OAKS

C. F. Korstian, Appalachian

The study of factors controlling germination and early survival in the oaks has brought to light some rather striking results. A field study made to determine just what happens to the acorn crops showed that in many cases, particularly in those of limited seed production, from 90 to 100 per cent of the available supply of acorns may be consumed or otherwise destroyed by animals (one season's study gave average percentages varying from 57 per cent in red oak to 75 per cent in chestnut oak). Among the mamals and birds known to feed upon acorns the following may be listed: deer, bears, cattle, hogs, squirrels, chipmunks, mice, turkeys, crows, jays and blackbirds. Besides the losses from these sources, a significant percentage of the crop is also destroyed by insects especially the nut weevils, amounting in some cases to over 50 per cent.

Many of the acorns which escape the rodents and insects are subjected to drying, resulting in the loss of viability or the death of the newly germinated seedlings. In places adequately protected by leaf litter or other moisture-conserving cover there may be found seedlings of white and chestnut oak which became rooted in the autumn. In the absence of a protective covering of either leaf litter or snow, the hazard is further increased by frost heaving which may lift the roots of newly germinated seedlings out of the soil. Unlike the white oaks, the red and black oaks germinate in the spring, often beginning as early as February in the southern Appalachians, but the acorns are still in need of the protective influence of the leaf litter during the winter.

A wide range in temperatures suitable for germination was found for all oaks studied under controlled conditions. No germination occurred in any of the species until the temperatures went consistently above 40° F. When both promptness of germination and total germination are considered, an average night temperature of 50° F and 65° F during the day gave the most satisfactory results. It was found that acorns can not withstand the amount of heat generated in ordinary leaf litter fires in the eastern hardwood forests. This further emphasizes the need for adequate fire protection wherever it is desired to reproduce oak by seed.

The prevalence of delayed germination in the black oak group was fully demonstrated. An increase in temperature within the vital range, while tending to shorten the rest period, is not alone sufficient to terminate it. The cause of delayed germination was found to be inherent in the embryo. The embryos of this group have a much higher fat content than those of the white oak group and the need of a rest period and of higher temperatures to hasten after-ripening is probably associated with enzymic action and the conversion of fate into soluble carbohydrates during after-ripening and the early stages of germination.

When acorns become over-dry their embryos assume a stony hardness and lose their viability. This hardening of the embryo and loss of viability was correlated with moisture content of the embryo. White oak acorns lost their viability when the moisture content of the embryo fell to between 30 and 25 per cent of their dry weights and the red oak acorns lost their viability at moisture contents of 15 to 10 per cent. Marked decreases in viability occurred when the moisture in white oak fell to between 50 and 30 per cent and that in red oak to between 30 and 20 per cent.

The results of two seasons' storage experiments indicate that low temperatures (33-38°F) and high atmospheric or high soil moisture are the most important factors controlling the retention of the viability of acorns in either artificial or natural storage. A supply of oxygen sufficient for respiration must also be available.

In an experiment to determine the influence of various kinds of substrata on survival of oak seedlings the newly developed roots successfully penetrated moss-covered and sod-covered soils, but were for the most part utterly unable to penetrate compacted bare soil, running instead along the top of the soil or sometimes pushing the acorns over backwards. These are killed by the first dry weather. On the basis of 630 measurements and with the penetrometer and substrata used, the limit of penetration for oak radicles appears to occur in soils, the penetrability of the surface layer of which lies between 0.01 and 0.023 mm. per gram of load applied.

This experiment, together with others, emphasizes the great importance of a leaf litter cover in producing conditions suitable for acorn germination and the survival of the seedlings due to its influence in reducing water loss, equalizing temperatures and facilitating root penetration by keeping the surface soil mellow.

These studies indicate that optimum seed-bed conditions can be maintained and the natural regeneration of oak by seed most easily secured under a form of partial cutting, either by the selection method or by the shelterwood method in which the stand is removed in two or three successive cuts.

Certain phases of the oak regeneration problem will be continued by the Appalachian Station. The loss due to animal agencies is so important a factor as to suggest the desirability of more intensive studies by representatives of the Biological Survey.

FOREST EXPERIMENT STATIONS

Washington

The Washington office has taken on a rather forlorn appearance following the summer exodus. Mr. Clapp left the middle of the month for a trip through the western districts, planning to visit the experiment stations in each of the western regions. He plans to return to Washington about the middle of September. Mr. R. E. Marsh will not report to Washington until later on in the fall. He is now travelling in the west with Mr. Clapp. Mr. Chapline left for an extended trip and will not return east until about the first of November. Reineke left shortly after the first of July for the Northern Rocky Mountain station to be gone until some time in September. He is assisting Haig on the white pine yield study. Sparhawk is now in the Lake States region where he will be for several months, his study being that of the forest economic conditions in Wisconsin. Miss Stockbridge took her vacation in New York State. Munns spent two weeks at the Northeastern Station. After a few days in Washington he plans to leave for Asheville to be gone another half month. This has left the general office work in the care of Mr. Betts and Mr. Bruce.

Committee on Growth and Yield

The Committee on Growth and Yield has completed its activities, and the final report of the committee is being sent to the Editor of the Journal of Forestry for publication. This committee, it is felt, has performed its duties well and has turned out a very creditable piece of work. Because of their active participation in the preparation of this report, much of the credit for it is due the men at the various experiment stations who, though not officially members of the committee, were represented through the chairman.

Forest Measurements

The Section has been very badly disorganized during the past month due to the summer vacations. At present, however, the force is again somewhat back to normal and the work is again proceeding as best it can under the handicaps of a Washington summer. The new tabulator, which will assist materially in the output of the statistical section, arrived the end of the month and will soon be installed. The new electric sorter, which will materially increase the sorting output of the tabulating cards, will not be available until very late in the fall as the company is far behind in its orders.

Foreign Affairs

Various stations have sent to different European foresters small quantities of seed for investigative purposes. Several letters have been received lately thanking us for these courtesies extended at a time when

it is almost out of the question for foreign purchases to be made here on account of the unfavorable rate of exchange. More recently we have had a letter from Dr. Schenck, who plans to return to the United States later on in the fall for a series of lectures, and who is very much interested in the introduction of American trees in Europe. He writes as follows:

"Should there be a good crop of western forest tree seeds this summer and fall, all European experiment stations will be, I am sure, deeply grateful to you, if you will supply them with seeds from specified localities; in each case, a few grains will do. The forest experiment stations of America can do as much by these simple means for international amity amongst foresters as do the millions of the International Board of Education, toward the same end."

Another letter indicates that the seed is much appreciated because of the difficulty of getting seed of particular localities and true to species.

Prof. Arthur F. Fisher, of the Philippine Forest Service, paid a brief visit while passing through Washington. He was very much interested in the development of the forest experiment stations and told us many of the difficulties that foresters in the Philippines find in their growth studies. Because of the lack of definite annual rings it is necessary to lay out sample plots in which they have a definite record of the establishment of an individual tree that the entire life history of the stand may be followed through from the beginning. This means an enormous job in view of the many sites and species, and the length of time necessary to complete the full forest cycle. However, they already have a number of years behind them in this and, as growth is rapid, Prof. Fisher believes that they will have the answer to many of their problems even before we, who have the advantage of easy age determination, can work out many simple facts of American silviculture.

Personnel

Those members of the experiment station who have not had an opportunity of seeing the Scientific Monthly for July should by all means procure a copy and read Dr. C. D. Ball's article on personnel. It is not believed that the experiment stations fully appreciate the personnel problem confronting silvicultural research. Assuming that our progress continues at a fairly constant rate, we shall require several men a year for the experiment stations. An effort should be made, as opportunities present, to interest the forest schools in giving to the kind of men we desire that training which will best fit them for research. The stations should also recognize that they can play a very decided part in the training of men by giving employment first to those men who are recommended to us by the schools as possible research material and by encouraging those who have desirable traits and an aptitude for research, to continue their scholastic work in such a way that they will become station possibilities later.

Advanced Training

Three men, all of whom are now associated with the Appalachian Forest Experiment Station, have applied for and received permission to take leave of absence this next school year to take advanced educational work. F. W. Haasis, Assistant Silviculturist, goes to Johns Hopkins to work for a doctorate in forest ecology, and A. F. Hough and L. F. Kellogg go to Yale this fall to obtain their Master's degrees.

Patent Applied For

In order to protect the instruments developed by the forest experiment stations for use in silvical research, patents will be applied for. A patent has been requested for the Dunning core measuring device and an application is now being prepared for a patent on Haig's circular slide rule for measuring tree heights. A few of the latter instruments have been made up and are available in Washington for those who desire to use them. The instrument probably would be more satisfactory for larger sized trees than for those of rather medium heights. The instrument is printed on xylonite and will fit into the ordinary letter size Tatum holder so that it can be carried readily in the field.

Abstracts

With publications issued in 1926, Botanical Abstracts goes out of existence and is replaced by Biological Abstracts. Unfortunately, some of the periodicals assigned to station men were not completely abstracted before the time limit (July 30) for the last issue of Botanical Abstracts arrived. It is hoped that greater care will be exercised in preparing material that in the next few years all periodicals will be kept up to date. Those having back numbers still hanging fire should not let publications accumulate until abstracting becomes a hopeless proposition.

Library

During July there were 921 books and periodicals loaned from the library, and 115 members of the Service and others consulted the library in person.

The librarian indexed 208 books and articles for the card catalogue last month.

NORTHEASTERN FOREST EXPERIMENT STATION

Behre spent the early part of the month on office work connected with his mensuration project. After a short trip to the sample plots near Union, Connecticut, he left for Ashland, Maine, to obtain additional field data. He was accompanied by G. W. Dean as field assistant.

Westveld completed the first draft of the progress report on his methods of cutting study. He spent the week of 19-25 in the vicinity of Twin Mountain, New Hampshire, with Mr. Munns. He was then joined by Dr. Spaulding with whom he is carrying on a brush disposal study, working in sample plots in the vicinity of Twin Mountain, Lincoln, and Patten, New Hampshire.

Stickel continued the inflammability work in the Harvard Forest. Up to the present time he has not succeeded in starting a single fire with cigarette butts in white pine litter, even with duff moisture as low as 4 per cent; nor do pipe heels seem to be more effectual in starting fires than cigarette butts. Wind seems to be the critical factor in all tests thus far, both at the time the test is started and during the time the pipe heel is smoldering in the duff. In order to create wind conditions a small motor has been installed to which a fan is attached. Velocity will be regulated by a small rheostat placed in the circuit of the motor, while a small air meter will be used for the readings.

Visitors to the Harvard Forest during the month were: Mr. Munns, Washington; Dr. J. V. Hoffman of the Pennsylvania State Forest School at Mt. Alto; Dr. Brooks of Clark University; and G. A. Loveland, meteorologist in charge of the Weather Bureau station at Boston, all of whom were much interested in the fire weather and soil moisture studies.

Computation work on fire statistics is practically completed, with the exception of weather data for Maine, which are proving somewhat troublesome since the data at hand from the Eastport and Portland stations represent nearly typical marine conditions.

LAKE STATES FOREST EXPERIMENT STATION

July was marked by the visits of the Secretary of Agriculture and Mr. Sherman. While in Minnesota, the Secretary visited Cloquet, where he was taken through some of the wood-using plants and later to the Forest Experiment Station, a dinner being served at noon in the grove at the Station by the local people. Mr. Sherman, accompanied by Mr. Tinker, spent from August 12 to 16 in the Twin Cities.

Following Mr. Sherman's visit, Mr. Zon spent a week in company with R. S. Kellogg visiting the pulp and paper mills of northern Minnesota, and on July 28 left for a field trip in Wisconsin and Michigan. On July 29, he addressed the Summer School of the University of Wisconsin at Madison, and on July 30 and 31 attended the annual meeting of the Northern Hemlock and Hardwood Manufacturers' Association at Wausau, Wisconsin, where he discussed the results of the study of the comparative costs of logging small and large trees. From Wausau he went to Marquette to inspect the work under way at the Upper Peninsula sub-station and to arrange for Colonel Greeley's visit in September.

The first of the month Kittredge spent a week with Gevorkiantz and the crew of the Cloquet Station in the vicinity of Blackduck, Minnesota, in connection with the aspen-birch study. The latter part of the month he spent in upper Michigan, starting a crew from the Michigan State College on a study of scrub oak lands.

The first part of the month Brown and Verrall completed the compilation of the volume table handbook to be issued by the University of Minnesota in cooperation with the Station. Since then they have been at the Upper Peninsula sub-station cruising the timber on the station area and making plans for the methods of cutting study to be carried on there.

The work of clearing the administrative area at the Upper Peninsula sub-station was completed about the middle of the month and Mitchell returned to St. Paul, leaving Wackerman to handle the work remaining to be done.

On July 22 word was received from the Cleveland-Cliffs Iron Company that its president, Mr. Mather, had approved the donation of an additional half-section of land to the Station to include the administrative site. Deed turning this over to the Government is now being prepared. This tract, (the S½ of Sec. 25), corners with the half-section already deeded and consists of partially cut-over hardwood and swamp land. This gift will not only provide title to the administrative site but furnish ample room for experiments in the rehabilitation of cut-over lands and studies in the handling of second growth.

As previously reported, projects on the Minnesota National Forest occupied Kittredge's time throughout May. Hopkins and Stott of the Minnesota National Forest worked with him alternately during most of the period. The

Norway pine permanent plots which were established by Bates and Petheram in 1923 and which were cut over under a timber sale last winter, were remeasured, the trees tagged, and the production strips recounted. The cutting was carefully done and little damage to trees or reproduction resulted, thanks to the interest and supervision of the local forest officers.

Several days were spent examining the timber sale areas of 1922 to 1925 in the maple-basswood type where cutting methods to encourage the desirable species was one of the new projects. The proposed sale area for the coming season and older cuttings near Ottertail Point were examined. The problem is a difficult one. Sugar maple and balsam predominate under more desirable species in the reproduction. They are extremely tolerant and are present as advance growth under the stands before cutting. There is little prospect of being able to control them by any method of cutting. Moreover, there are few trees of desirable species in good condition which can be left for a second cut. It appears to be a case where good silviculture will require the investment of funds. Counts and measurements were made on the different areas and a report prepared. Further consideration of the project is recommended before permanent sample plots are established.

The establishment of the four permanent sample plots in the aspen management study was completed. One was cut clean, 25 per cent of the crown area was removed on the second, 50 per cent on the third, and one left uncut as a control. The natural white pine seedlings were counted on reproduction strips. Seed spots of white pine and white spruce with and without removal of the litter and with and without rodent screens were put in. A section of each plot was surrounded by wire fence to evaluate the factor of rabbit damage.

The thinning plots in a twenty-year stand of Norway pine established in 1923 by Bates and Petheram were completely destroyed in a crown fire on May 15. A few days after the fire the tagged trees were remeasured and an attempt will be made to show the results of the thinning over the three-year period although the actual growth may not be exact because of the burning of the bark of most of the trees.

Finally, four plots were laid out in a 50-year stand of jack pine to try out the effects of different degrees of cutting on the reproduction of Norway pine. Four one-acre plots were laid out and the trees marked for cutting so that one is cut to remove almost all the merchantable material, a second to remove about 50 per cent in accordance with the marking policy in stands of that character on the fourth, and a third to remove only about 25 per cent of the basal area. These plots will be cut over in a timber sale next winter.

Visitors to the Station during the month: Mr. Sherman, E. W. Tinker, from District 2; M. H. Wolff from District 1; Dr. J. A. von Monroy, forester from Scherin, Mecklenburg, Germany; and Dr. Stepan Soudek, College of Agriculture and Forestry, Brno, Czechoslovakia.

CLOQUET FOREST EXPERIMENT STATION

Routine matters largely occupied the month of July. No new work was started. Fire study readings and swamp water level readings were taken.

The new shop was completed. The stucco house was painted and Hansen moved over.

Checking maps for the management plan was completed. The consolidated type map is completed save for the coloring. The report on five years of planting studies was rewritten in final form.

Visitors at the Station were Secretary Jardine, Dean Coffey, Mr. Zon, Dr. Schmitz, R. S. Kellogg, Mr. MacNaughton, A. B. Hastings, Crosby Hoar, Professor Fairchild, Professor Chapman, Mr. Hall, Mr. Herbert, a party from Clinton Falls Nursery, a party from the Mitchell Nursery, and numerous tourists.

APPALACHIAN FOREST EXPERIMENT STATION

With the arrival of field assistants, W. V. Garstka, Henry Bull and John H. Davis and Junior Foresters J. H. Buell and L. F. Kellogg, the three field parties of the Station were fully recruited. Both Buell and Kellogg joined the staff by transfer, Buell from District 6 and Kellogg from District 5. Kellogg will remain with the Station until September when he will enter the Yale School of Forestry.

L. J. Young, assisted by Bull, spent several days at Bent Creek taking records of germination on the oak plots established last fall by McCarthy and Haasis, and of this spring's experimental plantings in the Bent Creek bottoms.

Haasis and Davis made counts of previous year's plantings in the spruce type along the Mount Mitchell motor road, and reexamined the reproduction quadrats established in the methods of cutting sample plots on Curtis Creek in 1922. Toward the end of the month they were joined by Kellogg and left for Berea, Ky., to take measurements of plantations and sample plot reproduction at the Berea working center. Haasis reports that a dense growth of weeds 3 to 6 feet tall and tree reproduction 5 to 10 feet tall has come up on the cut-over plots.

A week of heavy rain brought the necessity for some much needed repairs to the approach road to the Bent Creek field laboratory in order to maintain it in a passable condition. This and other improvements to the laboratory grounds required the attention of Frothingham and Korstian at various times. Frothingham also spent some time preparing for the meeting of the Appalachian Forest Research Council to be held in Asheville August 6 and 7. Cow peas have been sowed on a portion of the experimental area in order to put it in better shape for subsequent use.

Mr. F. B. Merrill, State Forester of Kentucky, called at the office to discuss various matters pertaining to forestry in his State. Other visitors to the Station include Dr. Frank A. Waugh, Landscape Architect, Dr. Miller of the Public Health Service, and Assistant District Foresters C. G. Smith and James E. Scott. In company with Frothingham this party inspected the Bent Creek field laboratory and the adjacent experimental area and made suggestions relative to the landscaping and improvement of the grounds.

Professor W. H. Horning and a party of students from the Pennsylvania State Forest School visited the Station. Frothingham took them through the Biltmore Estate to see the plantations and to the Bent Creek field laboratory to see the experiments under way there.

Fire Damage Study

One field party remeasured seven permanent sample plots established in burned areas to determine fire damage. McCarthy went with Hough, Bull and Gartska to the large area burned this spring on the Boone division of the Pisgah and worked several weeks in that region. By strip and plot methods an area studied on Headquarters Mountain in 1922 was reexamined after the 1926 fire. Three permanent plots were established on this burn to keep a record of the growth rate of regeneration and of the decay of fire killed timber. In addition to sprout growth on this burned area a large number of locust seedlings were found established upon very severely burned land. Poplar, sassafras, grape, and other species which have hard seed coats were found growing in soil burned so severely that seeds on the surface were consumed. Complete killing of all seed trees makes certain that the seeds were preserved in the top soil.

Yield Studies

In addition to work on the fire damage study, McCarthy's party obtained two yield plots in oak and one in poplar. They also remeasured one permanent poplar plot established in a thinned stand by Mr. J. S. Holmes, State Forester of North Carolina.

Methods of Cutting Hardwoods

Frothingham and Young prepared a working plan for the analysis of cut-over areas as a phase of the methods of cutting project. Active field work on this study was begun on Horse Fork of Curtis Creek in cooperation with Supervisor Mattoon and Junior Forester Beichler of the Pisgah National Forest.

Southern White Cedar

After lying dormant for a year, due to Korstian's absence from Asheville on other work, he was able to resume work on the southern white cedar yield tables which are to be a part of a bulletin on the growth, yield and management of this species. Considerable time was spent in checking the yield tables against the volume tables. All of these checks were satisfactory except for a number of trees 8 inches and over in diameter which will require further work.

Forest Insect Investigations

On July 1, Mr. J. A. Beal, Assistant Entomologist, Bureau of Entomology, was assigned to the Station as its entomologist. Mr. St. George, however, will continue certain studies here during the field season. Beal graduated from the Massachusetts Agricultural College in 1923 and received the M. S. degree from Syracuse University in 1925. During 1923 and 1924 he was associated with H. B. Pierson, Forest Entomologist of the

State of Maine. He spent the summer of 1925 at the Harvard Forest in the employ of the Bureau of Entomology. The past winter was spent by Beal at the New York State College of Forestry, working toward a Ph. D. degree.

Beal made a trip to Cranberry, N. C., where the chestnut was reported to have been defoliated by insects for the past several years. The trees are said to die after the third defoliation and this has resulted in a forced cutting of the timber. Beal found that the injury to the chestnut was due to the activities of the larvae of the fall canker worm (Alsophila pometaria Harris).

At the request of the Virginia Hardwood Lumber Co., Beal visited Suiter and Bland, Virginia, on July 27 and 28 to determine the cause of the death of some three millinfeet of merchantable white oak timber. He found that a single hard freeze in May, 1925, has been responsible for the death of many of the overmature white oaks in the valleys and coves. McCarthy and Reineke saw this stand near Kimberling Springs in 1924 when it was in a healthy condition.

General

The outstanding events of this month were the appointment of Junior Forester Leonard I. Barrett and the resignation of Assistant Silviculturist E. W. Hadley.

Barrett joined the permanent staff on the first; he replaces George B. Shivery, who resigned in February to accept a position with the State of Tennessee. Barrett has had previous research experience at the Pacific Station, and general forestry experience on the Tongass National Forest.

Hadley resigned to accept the position of Assistant State Forester for Georgia. Our loss is the State of Georgia's gain because Hadley brings to his new work four years' experience with the Southern Station, particularly along the lines of reforestation, besides previous work with other units of the Service. We are looking forward to much future cooperation.

Ralph W. Hayes joined the staff as Student Assistant for six weeks. Hayes has lately joined the forestry faculty of L. S. U., coming from several years' work in the Indian Service, and a couple of years of teaching at the Colorado School of Forestry. He is to do long-deferred work on the plantations of the Great Southern Lumber Company at Bogalusa.

There seems to be a fair chance of our obtaining more office space within the next month or two. A room on the same floor of the Customhouse, more than twice the size of our present one and much better lighted, has been offered us, but approval by the Treasury Department in Washington is yet to be obtained. Additional space is needed very badly, especially since we are informed that the new fire inspector under the Clarke-McNary Law, with whom we are to share an office, will take charge about the first of September.

Visitors during the month included Department Conservator of Forests Duncan Stevenson of Belize, B. H.; and L. G. Lauck, Bureau of Railway Economics, who inquired concerning suitable retail lumber dealers in New Orleans from whom to obtain prices. It developed in the course of this inquiry that when one has obtained prices from a New Orleans retailer there is no use to inquire further - the prices will all be the same.

Measurements

Barrett worked up statistics for incorporation by Forbes in his bulletin on the rate of growth of second-growth pine. Forbes spent the better part of the month working on the text, tables, and securing of various statistical information for this bulletin.

Management

Demmon spent practically the whole month on extensive survey summaries and made considerable progress on them. Barrett put in several days counting rings on increment cores which had been collected on the surveys. He also spent a few days assembling some of the data.

Naval Stores

With the continuous help of two student assistants and additional aid from a local college student Wyman has been able to catch up on his field work and nearly to complete his 1925 report.

Wyman wrote an address entitled "Managing the Naval Stores Crop on the Farm" which is to be delivered by him during Farmers' Week.

Forestation

Wakeley spent some time reviewing the forestation projects with Hadley, preparatory to taking charge of this work. He put in several days at Bogalusa weeding the seed beds and doing other necessary nursery work. The nursery is in excellent shape.

Inadequacy of the germination tests will weaken, although not seriously, the main conclusions of Hadley's manuscript on kiln-drying cones.

CALIFORNIA

The end of July finds many questions concerning the California Experiment Station still unsettled.

Thus far the Secretary has definitely approved the appointment of the following members:

E. I. Kotok, Director; Duncan Dunning and A. E. Wieslander, Associate Silviculturists, H. W. Siggins, Junior Forester, and Dagmar H. Vinther, Clerk.

Mr. Clapp arrived July 21 and seems to be bearing up well under the program of long sessions with members of the staff, interspersed with visits with other interested parties. A trip to southern California was made with Kotok in connection with the proposed center of work there to study the watershed problem. The location of headquarters is yet to be determined.

A bad fire situation is making it difficult for Kotok to free himself from his old job and take up the new one at the same time.

Advantage has been taken of the delay in organizing the new station to press the office work in the Methods of Cutting project. Some very interesting results are being obtained from the further study of tree types. The advantages of careful tree selection in marking is clearly evident in the results of both growth and seed bearing.

Wieslander accompanied State Forester Pratt and a party of foresters and lumbermen on a week's trip through the yellow pine type of northern California and southern Oregon to study methods of slash disposal on private lands under the laws of the two States.

At a recent meeting of the Commonwealth Club, called to consider the results of a comprehensive study of drought, Kotok presented the fire-weather relationships. A brief summary of an attempt to correlate tree growth with seasonal precipitation by Siggins, and a similar summary of the effects of drought on the survival of natural seedlings by Dunning were also presented.

Dr. Tor Jonson, of the Swedish Forest School and Director of the Swedish Forest Experiment Station, paid a brief visit to the office July 27. Unfortunately there was insufficient time to discuss anything more than train schedules and other details.

PACIFIC NORTHWEST FOREST EXPERIMENT STATION

Without a drop of rain throughout the month over most of the District, bright sunshine, and many hot days, the drought has been acute, and the fire risk accumulating as evidenced by the pall of smoke which now enshrouds the region. This annual orgy of the fire demon is disheartening to those who have hope that some of the young growth on these logged-off lands may get to maturity, yet it is a challenge to fire research to find out how this curse of fires may be prevented or abated.

Meyer began his field work at this Station by taking up the application of the normal yield tables for Douglas fir to stands as they are ordinarily found. The nature of understocking in a stand as a whole is a peculiar one, since various factors may contribute to it, such as the original openness of stocking, the presence of complete failures along definite topographic features, and the activity of fire, insects and storms. The effect of each of these upon the yield is probably entirely different. To obtain an idea of the character of these several features contributing to understocking, strips are being run in typical second growth areas through a range of ages and sites. Continuous notes are kept while running the strip, the width of the strip is always checked in doubtful cases, each tree is calipered, and the tallies are changed every ten chains or whenever the character of the timber alters emphatically.

Isaac and Kienholz have both been on the Douglas fir natural reproduction study exclusively. The examination of the 150 temporary reproduction plots on logged-off lands is yielding disappointing results in that there is almost no 1926 reproduction. The tentative explanation is the very poor seed crop last year, which corroborates last year's findings that there is a close direct relation between the current seed crop and the amount of germination the following season. Isaac has found a suitable area for further seed catching tests on logged-off land and lately has been working out the details of this test and also of an experiment in screening (from rodents and from wind-blown seed) some freshly burned areas to isolate any germination that comes from stored seed.

Westveld returned to Portland on July 4 from a two months' field trip in central Oregon. He left a week later for the Blue Mountains accompanied by a field assistant. Later Dr. Long, Dr. Boyce and Mr. Munger joined Westveld for a week on the brush disposal study, Dr. Long coming from D-3 to give us the benefit of his experience from long study of the decay of yellow pine slash in the Southwest. He found the same fungi responsible for the decay of slash here as in the Southwest but their action is somewhat slower here probably because of the long summer dry season. The assistance of these pathologists in throwing light on this phase of our brush disposal problem is much appreciated.

McArdle and Simson spent considerable time together visiting active fires and got some first-hand information on their behavior and control methods. They were in on some fires on the Mt. Hood Forest and later on the big Eatonville, Washington, logged-off land fire and several smaller ones in the fir region. While they both were at Wind River a settler's house a mile from the Station and Nursery caught fire, thence spread to snags outside the clearing, and then got out of control. By skillful fire fighting and the help of five pumps it was confined to about 60 acres. A different wind would have put the Station buildings in danger. Unfortunately there seem to be almost annually at Wind River opportunities to study the behavior of forest fires in our very dooryard.

Munger devoted several days to another going-over of the Minimum Requirements Report for the Douglas fir region following the editing by the Washington office editors. While at Wind River last week he spent a day with Messrs. Chapline and Ingram on the grazing of logged-off lands study and so had an opportunity to discuss the interrelation of grazing research and silviculture research on this series of plots.

This Station has had a number of welcome visitors during the month, and considerable time was devoted to some of them to give them what they sought. Among these were Dr. J. A. von Monroy of Mecklenburg, Germany, Dr. Tor Jonson and Prof. Johannasson of Stockholm, Sweden, and Aldo Leopold of Madison. The latter accompanied Munger and Isaac on a trip to several logging operations in Columbia County and helped examine sample plots, interspersed with much worthwhile discussion en route.

Whenever forest fires are bad in District 1 they affect the work of the Experiment Station. The fire situation is particularly bad this year. Gisborne, Kempff, and two of our field assistants have been engaged in fire fighting almost continuously since July 6. Gisborne started at first to make observations and instrumental records on the fires but overhead and labor were so short, and so many fires were burning unattended, that he had to take a hand in actual suppression. What is a loss for Gisborne in not being able to study going fire conditions, however, is a gain on the side of experience fighting such fires.

The season this year has been unusually hot, dry and windy, with frequent lightning storms. It has been compared in this respect to 1910 - the worst fire season in the history of the Forest Service. On the Kaniksu Forest a number of fires were set by the first serious lightning storm early in July. Later storms added to these so that this Forest is reported to have had almost 200 fires burning at one time. Later on fires got started on most of the other Forests in the western part of the District. Many of the fires are now over 5,000 acres in size and the total area burned to date this season is estimated at 175,000 acres.

The following word from Kempff, while he was trying to fight several fires at once on Indian Creek, gives a vivid picture of the situation on the Kaniksu Forest: "We have only 33 men in camp, all told, with slight chances of increasing the crew due to labor shortage. We are engaged in checking the fire farthest down the drainage and hope to grab it today. It is about 30 acres. Three miles above us is a real one, minimum estimate of acreage 1,000 acres and going strong, slopes almost straight up and down and 3 miles of trail to cut to reach it. Not a soul has been to the fire so far. Across from it, halfway up the north slope is another orphan, sadly neglected but growing by leaps and bounds.----All we can do with our small crew is to hold the big fires up the creek from coming down the drainage, letting them burn up the mountain, for one has not far to go to reach the Priest-Pack River Divide. One of the main contributing causes, if not the chief one, is that according to the meteorograph we have had now 4 days of winds averaging anywhere from 10 to 18 miles per hour from 6 to 6 o'clock. I estimate that on an average of 3 hours after discovery most fires were beyond 2-man size. It was next to impossible to grab in time even all of those to which men could be dispatched."

During the last 10 days the Quartz Creek fire, which started a considerable distance to the southwest of the Experiment Station has spread over a vast acreage, and at one point is not very far from the experimental forest. This has been a source of some anxiety to us. Both Kempff and Gisborne were transferred to this fire, so as to be close to the station in case of fire reaching it. A pump has been made available for the station and a hose is stretched from Benton Creek to the buildings in readiness for immediate use. On July 19 the situation was so threatening that the women and children, comprising three families, were moved for two days to a ranch house that was safe from the fire.

Weidman has so far not been called for fire duty, nor have Haig and his crew, including Reineke and two field assistants. Haig has been on the Coeur d'Alene Forest during the month giving all his time to the white pine yield study. Twenty-four plots have been measured during the period as follows: 15 in stands 31-40 years old; 5 in stands 41-60; 2 in stands 61-80; and 2 in stands over 100 years old. In addition, Haig has collected 60 tree measurements in white fir and western hemlock, in order to strengthen the volume tables for these species which at present have a very slim basis.

Reineke reported in the middle of the month on a six-weeks' detail from Washington, to work largely with Haig on the yield study on which he will be a great help to us and will gain for himself a familiarity with the western white pine type and the difficulties of mensuration work in it.

In connection with the tree measurements taken by this crew, Reineke has been plotting the data on cross-section paper as the measurements were taken in the field. In this work he used the auxiliary scales designed by himself which permit computation of cubic volume by planimeter and direct reading of board-foot volumes from the graph made for each tree on the cross-section sheets. This procedure seems to be of practical field use and, if it proves to be so under various conditions will certainly effect a great saving in the office work of volume table studies.

Wahlenberg took some annual leave this month and spent the remainder of the time partly on field examinations and partly in his constant effort to clean up final reports before the termination of the planting research next winter. Evaporation and soil temperature records were taken about twice each week in connection with the establishment of planted stock under Ceanothus brush. The revised draft of the chemical weed eradication report was submitted July 17.

An interesting visitor during the month was Dr. J. A. von Conroy, a German forester traveling on the Rockefeller Foundation. He spent three days at Missoula and Savenac Nursery. Although he was interested in everything connected with the Experiment Station program, his chief objective seemed to be to learn of labor-saving devices and processes in forest practice. In this connection he was much interested in the pruner, baler and other machines by which mass production at the nursery is enhanced. He was most of all interested, however, in Wahlenberg's chemical weed eradication project and its extensive use in the nursery. He plans to try this method of eradication in his own nursery work in Mecklenburg, Germany.

ROCKY MOUNTAIN EXPERIMENT STATION

July

Since their return from the Black Hills July 6, both Bates and Roeser have been engaged on odds and ends of work at the Fremont field station, there being no outstanding activities. Bates, however, is finding it necessary to put in at least two days each week in the Colorado Springs office in order to keep up with current demands. Several days were so spent in the preparation of a report on the Nebraska trip and seed-selection problems, which report will be ready for submission as soon as photographic prints are received.

Roeser has been kept quite busy with current routine work on T-5, T-7 and T-8 and such extra time as is available is being spent on tree measurements in connection with M-1. Visitors to the Station are comparatively few this year and so do not demand as much time as usual. The Station leaflet also helps to save time.

Bates, as planned, has been working largely with soils and attempting to plan the best possible methods for conducting the large series of tests with nutrient solutions which are to be started this fall. From every angle it appears that the Nebraska sand is the best medium for the solutions, but even with this sand there will be some solutions and some additions to the chemically pure nutrients applied. As this will be a constant in all the tests, however, it perhaps should not give us much concern. Because of the large quantity involved, the use of quartz sand is entirely out of the question.

During the last few days of the month Bates has been experimenting in a small way with the transpiration of trees of considerable size. Trees 5-6 feet in height, if cut off at the ground and placed immediately in water, appear to supply themselves and to transpire in a fairly normal manner for a short time at least. By running a few such trees for a day each, with an evaporation record, it is expected to be able to compute about what seasonal transpiration would amount to on an acreage basis and to obtain further significant comparisons of the principal species. The method, while approximate, may perhaps come nearer to a practical answer to the transpiration problem than the previous experiments with very small seedlings.

The cutting of a 70-foot strip along the T-1 observation line has been completed, except for the removal of the logs.

Considerable elation was felt over the results of the controlled pollination of yellow pine trees at Fremont, including those of the mistletoe-resistant strain. This act was performed just before leaving on the Nebraska trip, and on our return all of the flowers covered by sacks were found to be in excellent condition, while nearly all those exposed to the weather in a normal manner were blighted, either by a freeze which occurred, or too much rain falling when they were receptive to pollen. At any rate it is demonstrated that injecting the pollen into the small sacks tied over the flowers was very successful.

At a conference with Marsh and Randles early in the month, methods of determining cutting cycles and yield were discussed in considerable detail in connection with the revision of working plans. Some of the recent findings of the experiment station in regard to growth on cut-over areas are being brought to bear on this problem. It has been found, for example, that acceleration after cutting has been given too much weight recently because the great acceleration which has been reported applies only to a small proportion of the trees,- those which are completely isolated. A finding which promises to simplify the calculation of yields is that after cutting, diameter growth is practically the same in trees of different diameters; that is, trees 24 inches in diameter put on about the same radial growth as trees 12 inches in diameter. In order to obtain reasonably good yields, it is absolutely imperative to leave adequate growing stock. To obtain an increment of 100 board feet a year, we must leave at least 3500 board feet per acre. This again emphasizes the importance of obtaining reproduction not only after cutting but before cutting, in order to build up the younger age classes and utilize all vacant spaces in the stand.

A pending fire trespass case in which some 40 acres of reproduction was destroyed on the Experiment Station tract has served to demonstrate the inadequacy of the expectation value method of assessing damages for loss of young growth in this region. This reproduction which ranged from 5 to 30 years old was appraised at 25 and 48 cents an acre according to the table of valuations given in the Manual. To replace it by planting would cost $20 an acre and a loss of 15 years of time. To replace it by natural reproduction and bring it to the present age would take about 30 years. A loss of 30 years in the rotation means an ultimate loss of about 3000 board feet per acre, which, at $3 per M, is worth $9. A value as low as 25 cents an acre is obtained by discounting the future value at 3%, and charging 5 mills an acre annually against fire protection. To suppress the fire cost the lumber company $500 and the Forest Service about $75. According to our valuation, the property was not worth the cost of protection and if the fire had been allowed to run its course the damage would probably not have amounted to as much as the cost of putting it out.

MANUSCRIPT REPORTS RECEIVED IN OFFICE OF FOREST EXPERIMENT STATIONS

Rocky Mountain

Best Season for Sowing Norway and White Pine at the Cass Lake Nursery. H. D. Petheram (For Journal Forestry)

Appalachian

A Forest Type Classification for the Southern Appalachian Mountains and the Adjacent Plateau and Coastal Plain Regions. By a committee of the Southern Appalachian Section, Soc. of American Foresters (For Journal of Forestry).

Damage by Fire in the Southern Appalachian Forest. E. F. McCarthy.

Weather and Forest Inflammability in the Southern Appalachians. E. F. McCarthy. (Jour. Agr. Res.)

Pacific Northwest

Timber Growing and Logging Practice in the Douglas Fir Region. T. T. Munger (Dept. Bul.)

Northern Rocky Mountain

Lightning and Forest Fires in District 1. H. T. Gisborne. (Mon. Wea. Rev.)

Southwestern

Acceleration of Growth in Western Yellow Pine. G. A. Pearson and A. D. Follweiler. (To Jour. For.)

Lake States

Report to the Advisory Committee for 1925 (Mimeographed)

IN PRINT

Bates, C. G. What shall we do with Engelmann spruce? (Colorado Forester, 1926).

Hadley, E. W. Tentative recommendations for nursery practice with Southern pines in the Coastal Plain. (The Cypress Knee, 1926).

Munger, T. T. The O. A. C. Fern-Hopper's Laboratory. The Geo. W. Peavy Arboretum. Ore. Agric. Col. Forest Club Annual Cruise, 1926.

FOREST PRODUCTS

District 1

Lumber Census

The final shipment of schedules for Idaho and Montana has been made. This completes the census work which was handled by District One, and the preliminary news item has been published. The following figures give the cut for these two States by species:

1925 LUMBER PRODUCTION - M feet B. M.

Species	Idaho	Montana
Idaho white pine	389,266	9,895
Western yellow pine	372,632	158,226
Western larch	105,337	133,303
Douglas fir	142,081	74,436
All others	131,460	12,209
Total	1,140,776	388,069
Lath production - M pcs.	134,340	32,209
Shingle production - M pcs.	17,636	2,710

Wood Preservation

Work on the post treating project at Miles City, Montana, has been in progress since July 10. Mr. Whitney, who is in charge of the work, has reported that due to the small capacity of the treating tanks it will probably be about the middle of August before the work is completed.

Lumbering Studies

Work on the mill scale study and the larch utilization study has been practically discontinued since July 15. At that time Bradner and Fullaway were called on fire duty.

Lumber Prices & Movement	Annual 1925	First Q. 1926	Second Q. 1926
Idaho white pine	$37.37	$37.10	$38.65
Western yellow pine	28.02	29.33	28.14
Larch-fir	19.33	19.33	18.05
White fir	20.14	19.79	19.86
Spruce	24.28	23.60	25.68

	June, 1925	June, 1926
Cut	192,053 M	183,828 M
Shipments	158,996 M	157,809 M

DISTRICT 5

Not much was accomplished during this month in project work. Mr. Hill was largely occupied with marine piling, besides which he spent some days on the work of the District Training Committee.

Mr. Davis from the Madison Laboratory arrived in the District on the 23rd on the Laboratory thickness study in connection with lumber standardization, having been compelled to shift his program to this District because of the serious fire situation in District 1. Mr. Brundage is accompanying Davis on his field work in this District, combining assistance to Mr. Davis with further study of white fir utilization.

The new census publication on "Lumber, Lath and Shingles 1924" was distributed with a circular letter summarizing points of special interest to the industry in this region.

DISTRICT 6

Air-Seasoning Study

The report, "The Air-Seasoning of Lumber in the Douglas Fir Region" by H. M. Johnson and W. H. Gibbons was completed. After being reviewed in the Washington office, the Forest Products Laboratory, and by a few men in the industry, it will be printed by The Timberman in serial form. The Timberman will furnish 600 reprints.

The reports dealing with air seasoning in the Inland Empire and California regions were especially well received by the lumber industry. Mr. Cornwall of The Timberman states emphatically that the Fullaway and Greene reports represent just about the one best job that the Forest Service has done for western lumberman.

Work of this general character could well run on indefinitely; the work is by no means cleaned up in District 6, or possibly in 1 and 5. A little work each year on this project would be well worth while, some particular phase of air seasoning being covered intensively and reported on. This would give a peg for reviewing the importance of certain essential factors, and in turn tend to keep "best practice" in air seasoning to the fore.

"Cold-Seasoning" Study

Reference was made in last month's report to a proposed study of the seasoning of thick and wide stock at the plant of the Standard Seasoning Society, Cottage Grove, Oregon, in which the Booth-Kelly Lumber Company, the West Coast Lumbermen's Association, and the Standard Seasoning Society are cooperating with the Forest Service.

During the month the grading and placing of the green lumber in the shed was completed. The stock consists of Douglas fir Clears, mostly "B and Better," with a small amount of "C," in 1, 2, 3, and 4-inch thicknesses and 8, 12, and 16-inch widths.

Western Hemlock for Box Tests

Upon request, 600 feet of 2x12"-16' western hemlock was shipped to the Laboratory. The material was supplied gratis by the Multnomah Lumber and Box Company of Portland, the company sawing the lumber special.

Plans are under way to make similar collections of "white" fir and western yellow pine.

General Survey of Waste in the Douglas Fir Region

Messrs. Hodgson and Koroleff continued their work on the general wood-waste survey. The work is progressing slower than was originally hoped. The matter of cooperation with the industry is working out in fine shape and the study is apparently well thought of.

The Polsen Logging Company and the Simpson Company are making a special effort to utilize small and less desirable material. Both of these companies in the beginning were so-called independent loggers. They now operate hemlock and shingle mills. Both have developed very satisfactory markets for hemlock lumber, both at home and abroad. Just recently the Simpson Logging Company has induced the Washington Pulp and Paper Company to install a pulp and paper plant near their sawmill at Shelton, Washington. This will place the pulp plant near this company's timber holdings. So-called waste from both the mill and logging plant will be utilized at the pulp and paper plant. This pulp plant will also utilize some of the waste from the mill (hemlock mill) of the Polsen Logging Company.

Stumpage Prices

The preliminary tabulations of the 1925 stumpage price study have been made. The various correction factors to bring all prices to comparable basis have not yet been applied, but preliminary computations indicate a slight weakening in the general price level in 1925 as compared with 1924. The weighted average of all sales reported, however, is somewhat above the 1924 figure because of a smaller percentage of western species in the last year. The weighted average of all timber in 1924 was $3.65 as compared with $5.57 in 1923, when but little western timber was reported, and $4.18 in 1925. In 1925, 59 per cent of the volume of timber sold was reported from the West as compared with 79 the year before.

Walnut was the highest priced species reported in 1925; the weighted average of all sales amounting to 1,821,000 feet averaged $40.75 per M feet on the stump. Cherry, ash and yellow poplar ranked next with prices of $10.45, $8.70, and $8.67, respectively. Aspen was the lowest price of all hardwoods; the 36 million feet reported averaged but $1.13 per M feet.

Among the softwoods, white pine continues to lead all other species. The 272 million feet of white pine reported averaged $9.05 per M. Norway pine ranked next with $7.49, while longleaf southern yellow pine ranked third with $7.02 per M. Cypress, for the most part small patches of timber scattered here and there mixed with other species, averaged but $6.12 while northern white cedar reached $7.85. Western white pine led all western prices, its average being $5.55 per M. Western yellow pine ranked next with $4.04, with Douglas fir at $2.98 per M and western red cedar at $3.34.

All softwoods together averaged $3.98 per M feet, and all hardwoods together amounted to $6.33. The 1925 softwood average is $.51 per M above that of 1924, and the hardwood average is $.22 above.

Adjusting the prices on the basis of species cut in 1924, the average stumpage price for 1925 for the United States as a whole is $5.48 as compared with a similar price in 1924 of $6.05. The decrease can be laid largely to the decline in second growth values in the South.

Of all States, Indiana with $18.18 per M had the highest State average, leading Ohio the next ranking State by $6.94 per M. The sales amounting to but 11 million feet, about 6 per cent of the cut of the State included mostly virgin hardwoods for veneer and other high grade uses. In New England the State averages run higher than in any other group of States, although the Maryland-Virginia group are close competitors. Both of these groups of States have long ago lost their virgin timber. The present values are based almost entirely upon second growth timber. In the lower Mississippi Valley States, the present low ruling prices for second growth pine kept the averages to a low level.

The Idaho prices including a relatively large percentage of western white pine led in the West. The State average of $4.35 exceeds Washington by $1.06, Oregon $.93, and California by over $2.00. The average price of $2.11 per M in California was the lowest of all States with the exception of Montana, where all sales averaged $2.05 per M.

Lumber Freight Bill Computations

According to computations recently completed, the gross freight bill paid by lumber consumers in 1924 was something like $408,000,000, an average of $12 on every thousand feet used. This includes hardwoods and softwoods, rail and water, domestic and imported, primary haul and redistribution.

The rail-shipped lumber was hauled on an average more than 700 miles. In 1914 the average rail haul was about 360 miles. In 1920 about 600 miles. The average rail haul would now be very much longer if it were not for the rapidly increasing quantities which go from west to east through the Panama Canal. If the rail haul continues to lengthen at its present rate of increase, the average haul will be 1,000 miles by 1935.

The average freight on lumber grown and used within the States is $5.32. For lumber hauled in from other States the charge is more than doubled, or $10.76 per M feet. The United States average, including imports, is $9.09. This, however, does not account for redistribution, the charge for which appears to be about $2.90 per M feet. The freight bill, omitting redistribution, is 310 million dollars of which 17 millions is due to imports of foreign lumber. To this add $98,000,000 for redistribution.

Out of total imports amounting to 1,766,068 M feet, 1,400,000 M feet comes in by rail, mainly from Canada. The bill for rail imports is over $13,000,000. Water imports cost for freight $3,700,000.

Altogether we pay $273,000,000 to the railroads and nearly $37,000,000 to the steamers which carry our lumber. In 1920 we estimated $230,000,000 for the rail bill and $20,000,000 for the water bill. Going up!

States Having High Freight Rates
(Dollars per M ft. B. M.)

	Domestic			
	Internal	External	Foreign	Aggregate
Iowa	7.59	15.07	17.80	15.12
Nebraska	5.00	13.74	15.60	13.81
North Dakota	..	13.17	13.58	13.23
New York	5.47	13.59	10.75	12.56
Kansas	7.60	12.48	..	12.48
South Dakota	4.56	13.17	13.58	12.08
New Jersey	4.61	12.41	6.68	11.98
Minnesota	4.91	14.05	14.15	11.91
Pennsylvania	5.67	12.34	8.20	11.45
Illinois	5.73	11.14	12.56	11.19

States Having High Freight Bills

(In Thousand Dollars)

New York	1,179	31,310	5,077	37,600
Illinois	88	27,170	1,843	29,100
Pennsylvania	1,281	22,566	812	24,659
California	5,676	15,097	716	21,489
Michigan	2,680	16,477	91	19,248
Ohio	599	14,242	546	15,386
Minnesota	1,000	8,801	566	10,367
Texas	4,611	5,465	149	10,225
Indiana	639	8,172	964	9,775
Massachusetts	323	7,204	2,217	9,748

To judge by the rates they pay, New York, New Jersey, Minnesota, Pennsylvania and Illinois appear to be about as badly off as the Prairie States. In regard to the size of the bills, New York alone pays 12 per cent and the ten leading States 60 per cent of the national total.

FOREST TAXATION INQUIRY

The month of July saw the initiation of the study of forest taxation in the Lake States Region, with headquarters at University Farm, St. Paul. Herbert reported here on July 1. Miss Jennie Goddard, Statistician, reported on July 26.

The first three weeks were devoted to making acquaintances in and about St. Paul and Minneapolis and to becoming familiar with sources of information and with studies already made or now in process by other investigators bearing upon the general problem of forest taxation in the region. In this task invaluable assistance was cordially furnished by officers of the State of Minnesota, the University of Minnesota, particularly the College of Agriculture, Forestry and Home Economics, the Lake States Forest Experiment Station, officers of the Minnesota Tree Society, and numerous individuals. Statistical studies covering the entire State were started and tentative choice of some half dozen counties for intensive study made.

On July 22 the staff, with the exception of the statistician and clerk, moved to Duluth, and the remainder of the month was devoted to making acquaintances and initial studies in St. Louis, Carlton and Lake Counties. A cordial reception was received at the hands of the county officials, the Arrowhead Association, and many prominent owners of forest and cut-over lands. On July twenty-seven the staff was entertained at luncheon by the Duluth Chamber of Commerce. On the twenty-eighth Fairchild left for New Haven, planning to return to Minnesota early in September.

GRAZING RESEARCH

Mr. Chapline left Washington July 10 for an extended field trip. Before his return, about November 1, he plans to visit Districts 2, 6, 1, 4 and 3 as well as the Texas and Southern Forest Experiment Stations.

The Erosion Exhibit, prepared by Mr. Chapline, is now on view in the Office of Exhibits. This attractive and instructive exhibit will be taken from Washington by the last of August and will be exhibited for the first time at the Amarillo Tri-State Exposition in Amarillo, Texas, early in September. Later on it will be exhibited at other State fairs and expositions.

Publications

"The Use of Salt in Range Management," Department Circular 379, by Messrs. W. R. Chapline and M. W. Talbot, has been released from the press. This is a very interesting publication from the range management standpoint and also contains several silvicultural notes.

Mr. Dayton attended a conference in the Office of Mr. Willingmyre, Extension Service, on July 27, for the purpose of discussing obtainment of data for the proposed Angora goat and mohair bulletin. A questionnaire has been prepared by Messrs. Chapline and Gage, which is now in type, and which will, if the Secretary gives his approval, soon be ready for distribution to all the Angora goat breeders in the country. It is estimated that $2,500 will be needed in placing this material in the hands of those interested, but it is expected that much valuable information will be secured thereby, and that, incidentally, the industry will be brought before the public and put on a plane to which its great economic importance entitles it.

Plant Identification Routine

In July, 17 plant collections, representing 541 specimens were sent to B. P. I. for formal identification. (N.B. This does not include miscellaneous correspondence or check identifications, of which formal record has not been kept.)

The District Forester at Portland, Oregon, in a recent letter states that a resident of Portland reports that he brews a very palatable beverage from the leaves and stems of Myrtle Pachystima (Pachystima myrsinites), than which few west-American shrubs are more widely distributed and common, and that this "tea" possesses "certain invigorating and medicinal properties." In 1921 Mr. D. C. Ingram quoted a report of medicinal properties of this species from the Crater Forest. It is hoped that the alleged tonic properties of this beverage come within the provisions of the Volstead Act, and that it is a cup which cheers but not inebriates. Supervisors may now look for a new line of special use permits.

SANTA RITA RANGE RESERVE

Carrying Capacity

The past two weeks have been spent in collecting utilization data for the various pastures on the Reserve together with rounding up the stock in order to check our records by actual count of the stock in each pasture. Adjustments in carrying capacity for the summer rainy season have been made in all but one of the pastures where such changes are included in the management plan. The unusually late start of summer rains has prevented these changes being made earlier as is the usual practice.

Handling Stock

Marketing:--Early in July Ruelas sold fifty-five head of fat cows which averaged 932 pounds and brought $43.00 per head with no cut. Among the number were about six head of short two-year-old heifers which pulled the average down somewhat. One bunch of ten head tipped the scales at 1,010 pounds apiece while some individuals were estimated at pretty close to 1,100 pounds.

On July 22 Parker sold a carload of nine-month-old calves that weighed 360 pounds and brought $27.00 per head with no cut.

Losses:--Several head of calves have been killed, during the month, by wolves which have, so far, eluded all efforts of the Biological Survey hunters. On his last trip to the Reserve, Mr. Nibby resorted to poison in a final effort to clean them out and may have been successful for no sign of the wolves has been seen for the past week.

Natural Revegetation

Precipitation and Growth:--Summer rains have been very late in arriving and even now the outlook is not altogether promising due to the fact that most of the rainfall has been in the form of light and local showers which have not been conducive to growth, and which show every indication of continuing. Between the first and twentieth 1.77 inches of rainfall at Florida Station but was entirely ineffective in starting growth. The first general rain occurred on the 20th and growth responded immediately and is now up from three to six inches all over the Reserve. Since the 20th 2.19 inches of rain have fallen making a total for the month of 3.95 inches at Florida Station. For the entire Reserve the average of the rainfall stations shows about 2.60 inches for the entire month.

Clipping Study:--The clipping study was started on July 28 just a week after growth started and the quadrats showed from 1 to 3 inches height growth in that interval. The quadrats in the present clipping study were laid out in 1925 and have only been clipped through one growing season. However, the series clipped weekly at two inches above the ground show a very much more vigorous growth than those in the series clipped at one inch above the ground.

Period Studies

Five new protected plots have been established during the past week, one at each of the following stations:--Huerfano, Foothill, Forest, Road and Southwest. These plots are merely additions to already established protected plots at these stations and are for the purpose of arriving at a more accurate determination of the current year's growth of forage. They also enable a comparison of areas that have been under protection for varying lengths of time.

Personnel

On July 3, Mr. Turner was joined by his wife and son Fred who had been on a vacation at Fort Summer New Mexico.

Visitors

On July 4th Messrs. Fraps and Pessin passed the Station on a plant collecting trip. The former is connected with the Carnegie Laboratory in Research work while the latter is Associate professor of Plant Physiology at the Texas A. & M. College.

Deputy Supervisor McKenzie paid a hurried visit on July 8 en route to the Pine Pass fire near Mt. Baldy. He was accompanied on his trip to the summit by Junior Range Examiner Turner who spent several days on the fire line and seconds the statement that the fire "sure was in a rough country." We appreciate these visits from the Coronado personnel and only hope that it isn't going to be necessary to have a fire out here in order to get some of them out again.

On July 23 Messrs. Barnette and Hitchcock, working for the Australian government on Cacti beetles, spent a short time in the vicinity of the Station looking for specimens.

On July 25 Mr. MacFarren, U. S. Land Office Inspector from the Dept. of the Interior, arrived at the Station and camped for a couple of days while making an examination of near-by school sections for mineral withdrawals.

JORNADA RANGE RESERVE

Range Conditions

July, the first month of the growing season, has proven to be exceptional with respect to precipitation; the majority of the stations on the Reservation having registered approximately 4 inches of rain. This figure is but seven-tenths of an inch less than the mean seasonal or that for the months of July, August and September. Growing conditions continue very favorable; perennial grass growth is well started with several species beginning to head out. So far annual grasses have not put in an appearance, but summer weed growth is well under way. Cattle are in good shape generally and putting on flesh.

Plant Collections

As a result of the heavy spring and early weed growth this year, over 50 specimens were collected for the Jornada Herbarium. Approximately 25 of these species will be included in the 14th, Jornada Plant Collection, which will be submitted for identification this fall.

Meetings

Both Mr. Shoemaker of the District 3, Office of Grading and the Director, attended the joint meeting of the B.A.E., B.A.I. and Extension Service representatives at the State College on July 8, 9 & 10, at which time preliminary analysis of the data relative to the recent Southwestern Range Livestock Survey was made and discussed.

Visitors

On July 9, those in attendance at the Southwestern Livestock Survey meeting at the State College visited the Jornada Range Reserve and spent the greater part of the afternoon looking over the range and inspecting several of the vegetative projects. After supper, which was served at Headquarters, a number of points relative to the Range Livestock industry were discussed and the Jornada management plan was outlined and explained. On the return trip to Las Cruces, the party stopped at the State College experimental feeding project, which is being carried on at the Old Summerford ranch adjoining the Jornada. A second stop was also made at Stewart Well on the Reserve for the purpose of viewing the new steel stock water storage tank which was nearing completion.

DISTRICT 3

Field examinations on the Tonto and Crook Forests in connection with the Browse Range project have occupied Mr. Copple's time. Panel exclosure construction, tagging and measurement of browse, quadrating and other routine in connection with various angles of such a study has been the detailed work.

Mr. Cooperrider has been engaged with compilation work in the Albuquerque office.

The unusual spring precipitation gave an excellent opportunity for collecting and study in that little-understood, semi-desert type in southern Arizona. Some considerable time has been given to study of this collection while reference works and the District herbarium were available. A large number of specimens have been prepared for transmittal to Washington for identification or check identification. Reference material applicable to the flora of Arizona under the Mogollon Rim is about as rare as some of the plants.

Compilation of data on a carrying capacity pasture in the aristidagrama yearlong turf range of New Mexico shows that an average use of 5.9 forage acres per cow yearlong over an 8-year period has resulted in a decrease in density of forage grasses of 70 per cent, a change in carrying capacity from an average of 27 surface acres per cow to 58. A mathematical calculation based on the relation of use to condition determines 9.8 forage acres as correct usage.

The original pasture has been enlarged to care for about the same number of stock but at an increase in per head investment in land and fences of from $13.28 to $22.64. Erosion threatens the future productivity of the pasture.

A very significant relation exists between this pasture and large areas of yearlong range in the southwest, particularly to State lands and public domain, when one considers average stocking, resulting depletion, erosion and economic stress.